Unit 15
Day 2
The Remainder Theorem

Remainder Theorem: If the polynomial P(x) is divided by x-k, the remainder is P(k)

÷(x+5)

1) $P(x)=x^3+8x^2-5x-84$ $k=-5$

$-5 \mid 1 \quad 8 \quad -5 \quad -84$
$\quad\quad -5 \quad -15 \quad 100$
$\quad 1 \quad 3 \quad -20 \quad 16$ ← remainder

$\therefore f(-5)=16$

$f(-5)=(-5)^3+8(-5)^2-5(-5)-84$
$=-125+200+25-84=16$

2) $f(x)=2x^3+3x^2-8x-12$ $k=-2$

Find F(k)

$-2 \mid 2 \quad 3 \quad -8 \quad -12$
$\quad\quad -4 \quad 2 \quad 12$
$\quad 2 \quad -1 \quad -6 \quad 0$

$f(-2)=0$

$f(-2)=2(-2)^3+3(-2)^2-8(-2)-12$
$=$

When is the remainder theorem useful?

Is $P(x)=-2x^{19}+8x^{17}-6x^{10}+x^8+12$ divisible by x-2?

$2 \mid -2 \quad 0 \quad 8 \quad 00\ldots -6 \quad 0 \quad 1 \quad 00\ldots 12$
$\quad\quad -4 \quad -8 \quad 00 \quad\quad 0 \quad -12 \quad -24 \quad -46$
$\quad -2 \quad -4 \quad 0 \quad 00000 \quad -6 \quad -12 \quad -23 \quad 46$

$P(2)=-5876$

Is $P(x)=x^{26}-6x^{18}+3$ divisible by x-i

$P(i)=(i)^{26}-6(i)^{18}+3$
$=i^2-6i^2+3$
$=-1+6+3=8$

$P(i)=8$
NO

Extra problems:

1) Is $P(x)=x^{99}-2x^{52}+x^{2}$ divisible by $x+1$?

2) Is $P(x)=x^{101}+3x^{20}+x^{3}$ divisible by $x-1$?

3) Find the value of k so that $(x^{2}+4x+8)\div(x-k)$ has a remainder of 4.

$k^2+4k+8=4$

$F(k)=4$

$x^2+4x+8=4$

HW pg 290-291 1-4 all, 20-30 even & Extra problems